

AIRCRAFT ACCIDENT REPORT

OPNAV FORM 3790-1 (REV. 1-62)

PAGE 1 OF 7 PAGES

OPNAV REPORT 1750-1

THE AIRCRAFT ACCIDENT BOARD SHALL SUBMIT THIS REPORT TO THE C.O. OF THE ACTIVITY CONDUCTING THE INVESTIGATION. IT SHALL THEN BE FORWARDED BY THE C.O. IN ACCORDANCE WITH CURRENT AAF INSTRUCTIONS.

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| 1. DATE OF ACCIDENT 19 April 1963 | HOUR 1435 | 2. ACTIVITY SUBMITTING REPORT FITRON 192 | 3. AIR SERIAL NO. 3-53 |
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| 4. MODEL A/C & BUNO. F9F-5 125293 | CHECK DAMAGE TO A/C <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E | 5. REPORTING CUSTODIAN OF A/C Fighter Squadron 192 |
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| 6. NAME OF UNIT OPERATING THE A/C Fighter Squadron 192, NAS, Moffett | BASED AT 2 miles Southeast of Livermore, California | OPERATIONAL CHAIN OF COMMAND CAG-19 - ComFairAlameda - ComAirPac |
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| 7. LOCATION OF ACCIDENT 2 miles Southeast of Livermore, California | 8. UNIT TO WHICH OPERATOR ATTACHED Fighter Squadron 192 |
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| 9. PERSONNEL INVOLVED MOORE, Charles Ray (b) (6) 1310 LT., USN | (Including names and injury code of those injured, not members of A/C) |
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| A | B | C | D | E |
|--|-----|--------|----------|--------|
| FULL NAME, RANK, SERVICE, FILE NO. (List persons in order first) | AGE | BILLET | POSITION | INJURY |
| MOORE, Charles Ray (b) (6) 1310 LT., USN | 27 | Pilot | Cockpit | A |

245815

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|-------------------------|------------------|------------------|----------------------------|---------------------------|---------------------------|-----------------|
| 10. PILOT EXPERIENCE | TOTAL ALL MODELS | TOTAL THIS MODEL | LAST 12 MONTHS: ALL MODELS | LAST 3 MONTHS: ALL MODELS | LAST 3 MONTHS: THIS MODEL | INSTRUMENT RATE |
|-------------------------|------------------|------------------|----------------------------|---------------------------|---------------------------|-----------------|

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|-------------|--------|------|-------|------|------|-------------|
| TOTAL HOURS | 1970.0 | 83.4 | 266.3 | 60.8 | 49.8 | PILOT'S AGE |
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| INSTRUMENT HOURS | | | 17.7 | 14.2 | 5.3 | 27 |
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| NIGHT HOURS | | | 12.6 | 2 | 1.2 | DATE DESIGNATED |
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| CV LANDINGS DAY/NITE | 137 | 0 | 57 | 0 | 0 | 11-15-65 |
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| 11. CHECK <input checked="" type="checkbox"/> INCIDENT TO FLIGHT <input type="checkbox"/> NOT INCIDENT TO FLIGHT | 12. PURPOSE OF FLIGHT Squadron Weapons Deployment | CODE LJ/1A14 | 13. TIME IN FLIGHT 7 minutes |
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| 14. TYPE OF ACCIDENT Airframe failure in flight | 15. MANEUVER INVOLVED Straight and level flight |
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| 16. WEATHER <input checked="" type="checkbox"/> VFR <input type="checkbox"/> IFR | CEILING 6500 | VISIBILITY 8 | 17. DARKNESS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | 18. CLEARANCE ISSUED VFR |
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| 19. WIND DIRECTION ESE | FORCE 16 | ATTITUDE ON IMPACT Nose down | ANGLE OF IMPACT 45° | STOPPING DISTANCE 15 feet | SPEED ON IMPACT 350 knots | 21. DTO FIRE FOLLOW (IMPACT) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |
|---------------------------|-------------|---------------------------------|------------------------|------------------------------|------------------------------|---|

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| 22. AIRCRAFT AND ENGINE DATA (Do not do in event of material failure of malfunction, actual or suspected) |
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| | | | | | | | | |
|---------|--------------|---------------------|---------------------------|--------------------------|----------------------------|------------------------------|-----------------------|----------------------|
| HISTORY | SERVICE TOUR | MONTHS IN THIS TOUR | TOTAL NUMBER OF OVERHAULS | FLT HOURS SINCE OVERHAUL | FLT HOURS SINCE ACCEPTANCE | TYPE OF CHECK LIST PERFORMED | FLT HOURS SINCE CHECK | NO. DAYS SINCE CHECK |
|---------|--------------|---------------------|---------------------------|--------------------------|----------------------------|------------------------------|-----------------------|----------------------|

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|----------|---|---|---|----|------|--------|----|---|
| AIRCRAFT | 1 | 3 | 0 | -- | 76.5 | 60 hrs | *3 | 4 |
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| MODEL ENGINE | SERIAL NO. OF ENGINE | | | | | | | |
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|---------------------|---------|---|----|------|--------|----|---|
| ENGINE 1 D-50-39-6A | F415119 | 0 | -- | 85.2 | 60 hrs | *3 | 4 |
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| ENGINE 2 | | | | | | | |
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| ENGINE 3 | | | | | | | |
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| ENGINE 4 | | | | | | | |
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| HAS THIS A/C BEEN DAMAGED IN PREVIOUS ACCIDENT(S) DURING PRESENT SERVICE TOUR | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | IF YES, GIVE DATE(S) OF PREVIOUS ACCIDENT(S) | RUD SERIAL NUMBER(S) OF THE ACCIDENT, IF SUBMITTED |
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| 23. CONTRIBUTORY FACTORS (Check or fill in only one primary "P" factor, all others secondary "S") | P S |
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| <input type="checkbox"/> PILOT (OR CREW) ERROR <input type="checkbox"/> MATERIAL FAILURE OR MALFUNCTION | P S |
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| <input type="checkbox"/> ERROR OF OTHER PERSONNEL <input type="checkbox"/> | P S |
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| 24. CHECK CONDITIONS INVOLVED IN THIS ACCIDENT (Check) | |
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|--|---|---|---|------------------------------------|---|
| <input type="checkbox"/> X-WIND, STACKWASH, SLIPSTREAM, TURBULENCE | <input type="checkbox"/> PITCHING OR ROLLING DECK | <input type="checkbox"/> COMMUNICATION DIFFICULTY | <input type="checkbox"/> AIRPORT HAZARD | <input type="checkbox"/> ROUGH SEA | <input type="checkbox"/> TERRAIN CONDITIONS |
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| 25. EMERGENCY CONDITIONS | | | | | |
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| <input type="checkbox"/> IMMEDIATE FORCED LANDING | <input type="checkbox"/> PRECAUTIONARY LANDING | <input type="checkbox"/> ENGINE FAILURE | <input type="checkbox"/> FUEL EXHAUSTION OR NEAR EXHAUSTION |
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| 26. PERSONNEL SAFETY EQUIPMENT USED | | | |
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| <input type="checkbox"/> PARACHUTE <input checked="" type="checkbox"/> EJECTION SEAT <input type="checkbox"/> SHOULDER HARNESS <input type="checkbox"/> SAFETY BELT <input type="checkbox"/> EXPOSURE SUIT <input checked="" type="checkbox"/> Q-SUIT | <input type="checkbox"/> PROTECTIVE HELMET <input type="checkbox"/> OXYGEN EQUIP. |
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| <input type="checkbox"/> LIST OTHERS | |
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| 27. ENCLOSURES AND DISTRIBUTION CHECK OFF LIST | |
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|---------------|--------|---------------------------------|---------|
| CHECK ENCL. # | CHECK# | DISTRIBUTION BY COMMANDING OFF. | (b) (6) |
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| PILOT | ORIG. (OPI) VIA CHN. OF COMD. | | |
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| LSD | CC | NAVAYSFACT DIRECT | |
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| END OFF. | CC | BUMER DIRECT | |
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| CAT. OFF. | CC | GVO-19 | (b) (6) |
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| WITNESSES | CC | NAS, Moffett Field | |
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| OTHERS | CC | ComFairAlameda | (b) (6) |
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| PHOTOGRAPHS | CC | | |
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| CHECK AND LIST OTHERS AS REQUIRED | | | |
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AIRCRAFT ACCIDENT REPORT
NUMBER 3-53

RESTRICTED

SECURITY INFORMATION

THE ACCOUNT

245-100

29. The Accident.

At about 1430, 19 April 1953, F9F-5 aircraft Bureau number 125293, modex 212B, piloted by Lieutenant Charles R. MOORE, USN, was involved in a fatal accident when the aircraft collided with the ground two (2) miles south southeast of Livermore, California. Lieutenant MOORE was section leader in the third division of a four division, fourteen (14) plane flight enroute from NAS, Moffett Field, California to NAAS, El Centro, California. Approximately seven (7) minutes after takeoff the left wing was seen to fold. (enclosure 6,7 and 8) The aircraft rolled to the left, entered a steep dive, and continued to roll to the left until it collided with the ground.

30. Damage to aircraft.

F9F-5 Bureau number 125293 exploded on impact with the ground and was totally destroyed.

31. The investigation.

During the course of the investigation the following facts were reavealed:

(a) On 18 April 1953, (b) (6) AMAN, a member of the squadron structures division, visually checked all aircraft on the line (BuNo 125293 was one of these aircraft) to insure that all wings were spread and that the lock lock indicator pins were retracted. (Enclosure 5)

(b) On 19 April 1953, approximately thirty (30) minutes were allowed for preflight inspection of the aircraft and completion of cockpit check-off list prior to take off.

(c) During the take-off, rendezvous, and climb out from the field the aircraft operated normally in all respects.

(d) At about five thousand feet of altitude after approximately seven minutes of flight the left wing folded in flight. (enclosures 6,7 and 8)

(e) The aircraft rolled to the left and entered a steep dive on the original heading, continuing to roll through out the dive.

(f) Fuel was seen streaming from the tip tank during the steep rolling dive. (Enclosure 9,10 and 13)

(g) The aircraft exploded on impact with the ground,

(h) The pilot did not eject from the aircraft.

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AIRCRAFT ACCIDENT REPORT
NUMBER 3-53 CONT'D

RESTRICTED

31. The investigation continued.

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(i) The canopy was found broken in two pieces about a quarter of a mile from the point of impact. Along the line of flight.

(j) A major aircraft inspection (60 hour check) was completed on BuNo 125293 on 15 April 1953. The aircraft did not fly between completion of the check and Lieutenant MOORE's flight on 19 April 53.

(k) No special work, other than the required inspections, service maintenance, and compliance with effective publications, was accomplished on the wings, wing stubs, wing folding system or wing lock system by this command.

(l) FASRON SEVEN, N.A.S, San Diego, installed the stall fence change, F9F aircraft service change number 138, prior to the acceptance of the aircraft by this command.

(m) The left wing main beam hinge (enclosure 14-a) was found in the wreckage. The fitting-lock L/R, part number 137065 L, (shown encircled in red on enclosures 14-B) was found to be enlarged and scarred on the forward side.

(n) The Commander, Fleet Air Alameda Board of Investigation found the forward section of the wing lock cylinder assembly, part number 134089 L/R, with the forward part of the wing lock cylinder piston, part number 138441, and the lock, part number 139096, intact. The wing lock cylinder piston was found to be in the retracted position (unlocked or forward position) and the lock was found to be in the unlocked position. The above information was received verbally by this accident board on 4 May 1953.

(o) A wrench, (enclosure 14-D) size seven-sixteenths, was found among the wreckage.

(p) The salvage of the wreckage was accomplished by the Naval Air Station, Alameda.

32. The Analysis.

A brief recount of the events prior to the time the aircraft rolled from the formation follows:

The pilots arrived the aircraft about one-half hour prior to take-off. Pilots loaded luggage, preflighted the aircraft, and were strapped in the cockpit before the first aircraft was started. One aircraft was low on oxygen and was filled before the first aircraft was started. This delayed the flight about five minutes.

Section take-offs were made in the order of divisions, first section, first division taking off first. Lieutenant MOORE's section was the sixth to leave the ground. In order that he execute a rapid rendezvous after take-off, it was necessary for him to enter

AIRCRAFT ACCIDENT REPORT
NUMBER 3-53 CONT'D

32. The Analysis continued.

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RESTRICTED
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a steep bank to the left. After the entire flight rendezvoused, it made a low pass (800 feet) over N.S. Moffett Field on a South-easterly heading. The flight then began to climb on a Northwesterly heading. Lieutenant MOORE signaled his wingman, LTJG (b)(6) to remain on his, Lieutenant MOORE's, left side, by dipping his left wing. The flight characteristics of Lieutenant MOORE's aircraft were normal in all respects up to this time.

At an altitude of about five thousand feet, while encountering slight turbulence, Lieutenant (junior grade) (b)(6) saw the left wing of Lieutenant MOORE's aircraft fold at the wing stub. The aircraft immediately rotated to the left, and entered a steep dive, continuing to roll. Witnesses state that fuel began to stream from the tip tanks. Witnesses also state that two rolls prior to impact, the wings appeared to be again straight. The aircraft exploded on impact and was completely demolished. The pilot did not bail out.

The F9F-5 aircraft pilots handbook states that the shaft of the cockpit wing locking control lever actuates a limit switch which operates the aileron booster emergency control valve. When the locking control is pushed down (lock) the limit switch operates the solenoid valve to restore pressure to the booster cylinder. Because the aircraft was flown in abrupt maneuvers during rendezvous with no apparent difficulty, it is the opinion of this board that the cockpit wing locking control lever was in the down (lock) position during the flight.

The fitting-lock L/E, part number 137065L, in the left wing main beam hinge, was found to be enlarged and scarred on the forward side. There are two possible explanations which may account for this. First, due to a misalignment of the wing, the movement of the wing locking cylinder piston during the locking cycle would cause the piston to strike the edge of the fitting, thus scarring it. Second, while the wing locking cylinder piston was retracting in flight due to a hydraulic pressure reversal. The first movement of the wing folding in flight under wing loading shear stresses would cause binding between the wing main beam hinge fitting-lock and the after end of the wing locking cylinder piston.

The fact that the left wing lock cylinder assembly was found partially intact including within it an unscarred, unmarked lock, part number 139096, indicates that the lock was never in the locked position. There are three possible explanations for this. First, the bell crank was not actuated due to cable elongation. Second, the possible retracted position of the wing locking cylinder piston, caused by wing misalignment prevented the lock from rotating into the locked position. Cable elongation, enabling the wing lock control lever to be pushed down, would have to be present in conjunction with a retracted (unlocked) cylinder piston. Third, a severance of the bell crank assembly from the lock (P/N 139096) shaft could enable

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32. The Analysis continued.

the lock lock indicator pins to be retracted without rotating the lock to the locked position.

The fact that the forward end of the wing locking cylinder piston was found in a retracted position within the wing locking cylinder indicates two possible conclusions. First, that a wing misalignment prevented the piston from locking the wings. Second, that a reversal of hydraulic pressure during flight caused retraction of the wing locking cylinder piston.

The fact that a wrench was found among the wreckage is a possible indication that it caused, (1) a restriction of hydraulic pressure, causing wing locking cylinder piston retraction, or (2) a binding between fittings causing a wing misalignment. This board investigated many possibilities of lodging a wrench in the wing stub but could find no possible way that the wrench would cause restriction or wing misalignment. It is also evident that there are innumerable other places within the aircraft where the wrench could have been located, other than in the wing.

22 319 The fact that (b) (6), AMN, USN, states that on his investigation of all aircraft on 16 April 1953 he found no unretracted lock lock indicator pins supports the theory that a malfunction of the wing locking system enabled proper retraction of the indicator pins without fully locking the wings.

Investigation of the entire wing locking system revealed that the lock (part number 139096) is a safety device to prevent retraction of the wing locking cylinder piston. Fifteen hundred pounds hydraulic system pressure hold the wing locking cylinder piston in the locked position. Even without the lock in the lock position, only a reversal of hydraulic pressure could cause retraction of the wing cylinder locking piston from the fully locked position. Even though the lock lock indicator pins are extended, and the lock (part number 139096) is in the unlocked position the wings will remain spread unless there occurs a malfunction in the hydraulically operated wing locking cylinder system.

33. Conclusions and Recommendations

The primary cause of the accident was a malfunction of the wing locking system causing the wing to fold in flight.

From the facts revealed by the investigation several conclusions are possible regarding the cause of the wing folding in flight.

(a) That due to a misalignment of the wing, the wing locking cylinder piston did not extend to the fully locked position and that because the lock (part number 139096) was in the unlocked position wing stress during flight allowed the wing locking piston to retract, unlocking the wings.

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33. Conclusions and Recommendations (Cont'd)

(b) The lock (part number 139096) may have been in the unlocked position, a reversal of hydraulic pressure in the wing locking system forced the wing locking piston to the retracted position, unlocking the wings.

(c) That the wings were locked, and properly indicated locked, and the wing locking piston sheared under wing loading stress, unlocking the wings.

It is recommended that the Bureau of Aeronautics in conjunction with Grumman Aircraft Corporation conduct a thorough investigation of the entire F9F-5 wing actuating and lock system. It is believed by this board that the system is overly susceptible to malfunction, most probably within the hydraulically operated section of the system.

It is recommended that a red warning light be incorporated in the cockpit to indicate that the wings are locked. The present flag system is inadequate because it is an insufficient reminder to the pilot to check the wing lock, and because the flags are difficult to inspect from the cockpit. By adding a warning light to the system, the glaring reminder to check the lock lock indicator pins would be ever present. A micro switch actuating the warning light should be placed in the wing stub in such a position that the wing locking piston (part number 138441) would have to be fully extended (locked) before the light would turn off. This would be a positive indication that the wing locking pistons were in the fully locked position.

It is recommended that all commands be immediately informed of the possibilities of improperly installing F9F aircraft service change number 138. Improper installation may cause misalignment of the wings preventing complete extension of the wing locking pins.

It is further recommended that all commands immediately include in the ground training syllabus a thorough brief on the operation of the entire wing actuating and locking system. Further, commands should emphasize the following pilot procedures and checks:

(a) Never fold or spread the wings in steps. Wings should be completely folded or completely spread before reactuating the wing fold control lever.

(b) The wing spreading cycle is not complete until the hydraulic pressure has built back up to 1300 to 1500 lbs. Only then should the pilot reengage the wing locking control lever.

(c) The lock lock indicator pins are the only true indication that the wings are fully locked.

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33. Conclusions and Recommendations (Cont'd)

(d) Wrinkled skin near the stall fence may indicate mis-alignment of the wings. Aircraft having wrinkled skin should be downed and a thorough check of the wings and wing locking system conducted.

(e) Merely pushing the wing locking control lever to the down (locked) position does not indicate that the wings are locked. Cable elongation or other malfunctions will allow proper control lever operation without actuating the lock lock, or lock lock indicator pins.

(f) It is finally recommended that an access hole be cut in the underside of each wing in a position such that the wing locking cylinder piston would be visible when the piston is in the fully locked position. Diligent use of such an access hole, covered by plexiglass, would assure pilots and plane captains that the wings were locked.

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WEATHER REPORT FOR 19 APRIL 1956, 1430

Moffett - Estimated 4000' broken 6500' overcast 12 miles visibility.
Very light rain showers. Temperature 56° dew point 47° wind E.S.E. 16
knots Altimeter 29.92, Humidity 71%.

Oakland - Measured 5000' overcast 12 miles visibility. Light rain showers.

Stockton - Estimated 5000' broken 16000' overcast. 20 miles visibility.

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Enclosure (1)

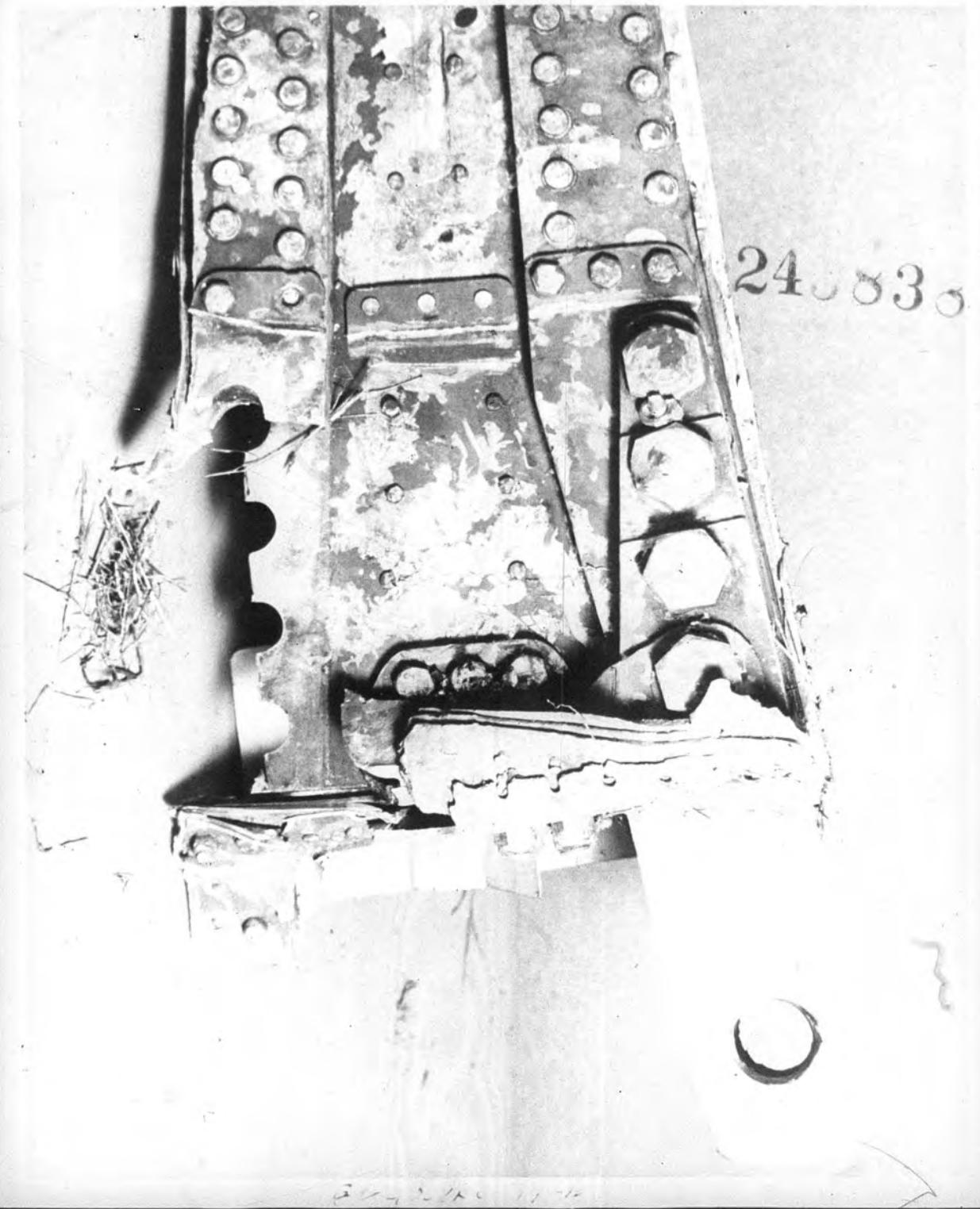




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Brake line

ENCLOSURE 14C



24-835

24-835

